

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Request of PTC-220, LLC for Waivers of)	WT Docket No. 13-59
Sections 90.729(b) and 90.723(f) of the)	
Commission's Rules)	

To: Chief, Wireless Telecommunications Bureau

**REPLY COMMENTS OF
PTC-220, LLC**

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EXECUTIVE SUMMARY

The majority of commenters supported PTC-220's Waiver Request, which is critical for the efficient and timely deployment of Congressionally mandated positive train control ("PTC") networks by both PTC-220 member and non-member railroads. NRTC, the only commenter to oppose the request, argues that the waiver will cause harmful interference, that its rights as a licensee will be undercut, and that a rulemaking proceeding is the only appropriate procedural vehicle. PTC-220 responds to each of these arguments below, and explains why the public interest strongly favors granting the waiver request to ensure adequate spectrum for PTC deployment.

NRTC's concern that it will suffer harmful interference if the Waiver Request is granted is unfounded. NRTC's technical analysis relies on a simplistic path loss model and grossly pessimistic assumptions to arrive at unrealistic conclusions about the impact of the Waiver Request. Using the Chicago area as an example, PTC-220 demonstrates that the use of more realistic path loss modeling and noise floor assumptions will result in only about 0.2% of the area being subject to coordinations between PTC-220 and other 220 MHz licensees wishing to deploy new stations.

NRTC's rights as a licensee will not be undercut because the Waiver Request proposes a coordination process which ensures that NRTC will be able to place new stations in the same locations as it could without the existence of the waivers. The proposed process – which lends clarity and certainty to the existing obligation of Part 90 licensees to cooperate on issues of interference – places the burden on PTC-220 to make any needed changes to prevent other licensees from suffering harmful interference at a proposed new site as a result of the waivers.

The public interest justifications strongly favor a grant of the Waiver Request. Without such a grant, up to half of PTC-220's spectrum will remain fallow and it will have to acquire more spectrum on the secondary market. This will mean less spectrum available for short line and commuter railroads. In some areas PTC-220 may be able to build additional sites to increase network capacity, but there are practical limits to such an approach; capacity may still not be sufficient to accommodate non-member railroads; and state, local and tribal governments will be burdened with processing many more tower site approvals. Moreover, without the waivers, the increased complexities of network planning and construction will increase the risk of missing the December 2015 statutory deadline for PTC deployment.

Finally, NRTC cites no compelling precedent to support its claim that a rulemaking proceeding is the only appropriate vehicle for the relief PTC-220 seeks. The statutory deadline for PTC deployment is a unique circumstance justifying waiver and, given the time constraint, is the only vehicle that can provide relief for the many member and non-member railroads that plan to rely on PTC-220's spectrum. If the Commission determines that a rulemaking is needed to address broader issues in the 220 MHz band, nothing prevents it from granting a waiver in the interim, as it has many times in the past.

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REPLY COMMENTS

I. INTRODUCTION

PTC-220, LLC ("PTC-220") hereby submits these reply comments to address the Comments of the National Rural Telecommunications Cooperative ("NRTC") filed in response to the public notice issued in the above-referenced docket.¹ In its comments, NRTC opposed the grant of certain waivers requested by PTC-220 that are necessary for the prompt and efficient deployment of Congressionally mandated positive train control ("PTC") networks using its 220 MHz licenses.² NRTC was the only commenter to oppose PTC-220's Waiver Request. In contrast, strongly supportive comments were filed by the Southern California Regional Rail Authority ("SCRRA"), the Association of American Railroads ("AAR") and Union Pacific Railroad.

As fully explained below, NRTC's technical analysis grossly overstates the potential for harmful interference. PTC-220's proposed protection criteria – an extension of existing FCC rules

¹ See Comments of the National Rural Telecommunications Cooperative, WT Docket No. 13-59 (filed April 8, 2013) ("NRTC Comments"); *see also* The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Waiver to Facilitate Deployment of Positive Train Control Systems, *Public Notice*, WT Docket No. 13-59 (rel. Mar. 8, 2013).

² See Request of PTC-220, LLC for Waivers of Sections 90.729(b) and 90.723(f) of the Commission's Rules, WT Docket No. 13-59 (filed Feb. 1, 2013) ("Waiver Request").

already applicable in the lower portion of the 221-222 MHz band – will ensure adequate protection for all adjacent-channel licensees.³ Moreover, a grant of the Waiver Request will not degrade NRTC’s ability to expand service in the future because, under PTC-220’s proposal, NRTC will have the ability to require PTC-220 to alter its operations as needed to ensure that a new NRTC station can be placed just as close to a constructed PTC-220 site as it could if there were no waiver.

Given the unique circumstances facing PTC-220 and the compelling public interest benefits of PTC, a waiver is the appropriate vehicle to be used in this case. A grant of the Waiver Request will: prevent spectrum in a historically underutilized band from lying fallow; reduce tower construction-related administrative burdens on federal, state and tribal agencies; permit PTC-220 to make spectrum available via lease to non-member railroads rather than competing with them for new spectrum; and help ensure that PTC networks are deployed nationwide by the December 2015 deadline. A rulemaking proceeding, as advocated by NRTC, would be tantamount to denial of relief, because the time involved in such a proceeding would be too lengthy to accommodate the massive network planning and construction that must be completed prior to the legislatively-mandated December 2015 PTC deployment date.

II. CONTRARY TO NRTC’S ANALYSIS, THE WAIVER REQUEST FULLY ENSURES THAT OTHER LICENSEES WILL BE PROTECTED FROM HARMFUL INTERFERENCE

In its comments, NRTC describes two potential mechanisms for interference from PTC transmitters to other receivers in the 221-222 MHz band:

³ Recognizing NRTC as the only other large holder of 220 MHz spectrum, PTC-220 provided NRTC with an advance draft of the key elements of its Waiver Request in October 2012 to solicit its views. Over the course of several weeks, the parties discussed potential interference issues and the as-filed Waiver Request reflects strengthened protection criteria based on NRTC’s recommendation. Until seeing the NRTC Comments, PTC-220 was under the impression it had addressed NRTC’s concerns about the potential for harmful interference.

- 1) Energy inside the Transmitter's authorized channel, and outside the receiver passband, referred to by NRTC as "Adjacent Channel" or "Overload" interference.
- 2) Energy outside the transmitter's authorized channel, but inside the receiver's passband, referred to by NRTC as "Co-Channel"⁴ or "Out-of-Band Emissions" (OOBE) interference.

These, along with a discussion of NRTC's method of estimating propagation path loss will be discussed individually below.

A. Path Loss Estimation

Assessing potential impairment of a receiver due to undesired signals from a "foreign" transmitter requires estimation of the transmitter's signal strength at the receiver. NRTC chooses to do this estimation with a version of the Friis Path Loss model.⁵ The Friis model is a simplistic approach based on free space attenuation, and uses only the distance between the transmitter and receiver, and the frequency as parameters. Because the Friis model ignores a number of other variables that can contribute to propagation losses, it often underestimates path loss, and thus overstates received signal levels. To account for this error, the model is often modified to use a distance exponent greater than 2.0.⁶ The larger exponent is normally empirically determined, and can range as high as four or five for mobile receivers near the ground. For outdoor fixed terrestrial 220 MHz transmitters and receivers well above the ground, the exponent is lower, but will rarely

⁴ NRTC's use of the term "co-channel interference" in this context should not be confused with the more common usage (and the usage employed in the Waiver Request), which relates to interference between two licensees operating on the same channel in geographically proximate license areas. PTC-220 and NRTC currently are not licensed for any of the same frequencies and thus cannot experience co-channel interference, as that term is typically understood, from one another. With regard to PTC-220's E Block holdings, where there are co-channel licensees, the Waiver Request explained that existing FCC field strength limits and coordination requirements will protect other E Block licensees. *Waiver Request* at 12-13.

⁵ NRTC Comments, Appendix II, Section IV.

⁶ A distance exponent of 2.0 represents perfect free space propagation, such as would be found in space, away from the effects of the earth, atmosphere, and other artifacts that can increase attenuation. A larger distance exponent accounts for these terrestrial impairments by increasing the rate of attenuation with distance. The "n" variable in NRTC's implementation of the Friis formula is the distance exponent.

be as low as the 2.0 level for any but the very shortest paths.⁷ In their comments, NRTC uses the modified Friis model with the distance exponent in a range from 2.0 to 2.4.

For consistency, simplicity, and to make comparisons easier, the analyses in these reply comments will also use the modified Friis model, but with the understanding that, for the kinds of systems under discussion, exponent values near 2.0 will be the exception.

B. Adjacent Channel or Overload Interference

NRTC shows in their Table 2 of Appendix II the geographical separation required between a transmitter at various power levels and a typical NRTC receiver to protect the receiver from Adjacent Channel Interference. Because all of the separation figures are well below those already required under Section 90.732(d), NRTC rightly concludes that “...the limits derived from Section 90.723(d) should generally protect *existing* NRTC base stations....”⁸

NRTC then expresses concern about their ability to deploy *new* base stations into a congested area that may include PTC bases with their attendant “exclusion zones.” First, this apprehension may be unjustified, as only a very small fraction of a congested area would be close enough to a PTC base to be of concern. *See* Appendix A for a more detailed analysis of this issue.

Second, PTC-220 has already addressed the issue of new Phase II or nationwide Phase I stations by proposing a coordination process whereby the licensees of new stations would have the right to direct PTC-220 to make any needed protection adjustments, ensuring that the PTC-220 site would generate no more interference at the new site than it would in the absence of the waiver.⁹

⁷ There is little literature on outdoor fixed point-to-point propagation between elevated sites in the 220 MHz band, and this statement reflects internal field investigations and the use of commercial propagation prediction tools.

⁸ NRTC Comments, Appendix II at 7.

⁹ Waiver Request at 16-17.

C. Transmitter Out-of-Band Emissions (OOBE)

NRTC's calculations suggest that a separation of 136.5 Km (84.7 miles) may be needed between a PTC transmitter and another receiver to prevent harmful adjacent channel interference.¹⁰ This number appears unreasonable on its face. It is based on some simplifying but grossly pessimistic assumptions, and a more realistic analysis will reveal a more accurate picture of the situation.

First, NRTC's analysis of emissions from PTC transmitters assumes that OOBE power levels would be equal to the mask limit, which they correctly give as -25 dBm in a 100 Hz bandwidth. However, the rolloff characteristics of PTC-220's radios show decreasing energy levels beyond the channel edge. This results in OOBE levels significantly below the mask in adjacent channels. Figure 1, taken from PTC-220's Part 90/Part 15 Test Report on file with the FCC,¹¹ illustrates this by showing a spectral plot of a PTC base station's emissions, along with a trace of FCC's Mask F.

Further, NRTC assumes a 12.5 kHz noise bandwidth for potential victim receivers. In common practice, a receiver's bandwidth is limited to somewhat less than the channel bandwidth in order to limit noise (such as OOBE from nearby transmitters) while still capturing most of the desired signal energy. For a 12.5 kHz channel a typical receiver bandwidth would be about 8 kHz.

Last, NRTC defines interference as a 1 dB rise in the noise floor at the receiver due to OOBE from a transmitter. Due to the dynamic and statistical nature of noise, a 1 dB change would be very difficult to measure reliably, let alone to notice. Even PTC-220's proposed 2 dB threshold may be challenging to determine in some cases, but PTC-220 feels that with a

¹⁰ NRTC Comments, Appendix II, Table 1.

¹¹ See "Test Report 1" at page 16, filed as exhibit to FCC ID BIB63030-24, *available at* https://apps.fcc.gov/oetcf/eas/reports/ViewExhibitReport.cfm?mode=Exhibits&RequestTimeout=500&calledFromFrame=N&application_id=589841&fcc_id=BIB63030-24.

combination of good prediction tools and extended monitoring, this level of measurement is achievable.

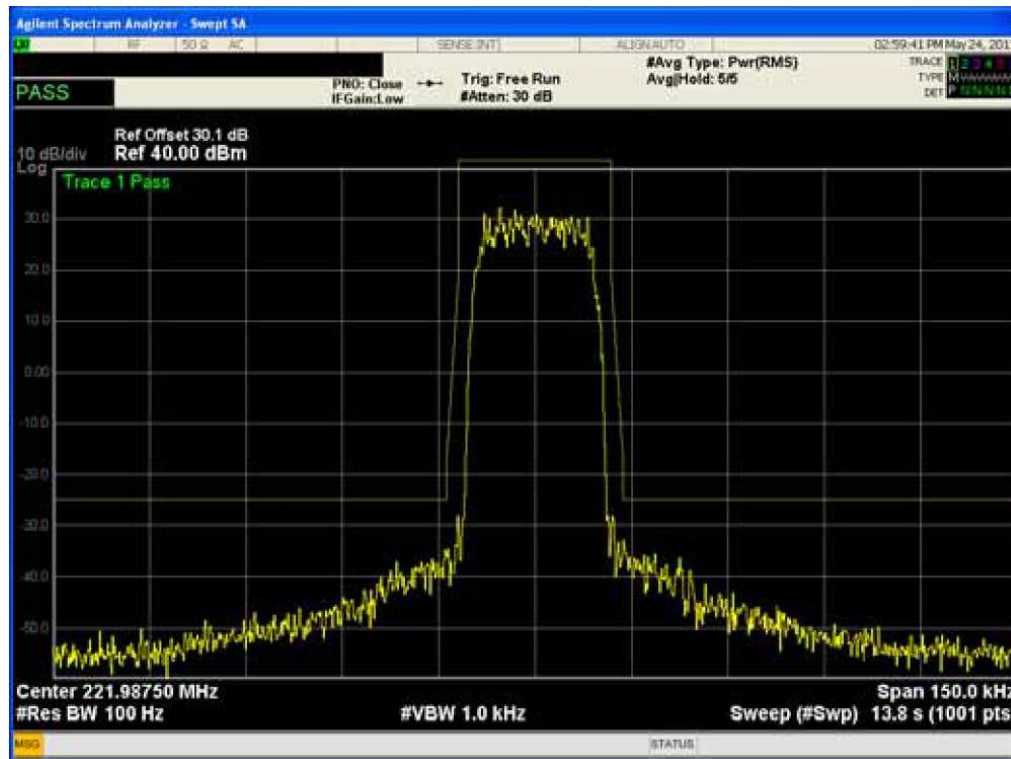


Figure 1: PTC transmit emission relative to FCC emission mask

Using these more appropriate figures to predict the potential impact of PTC OOB, PTC-220 believes that the provisions offered in our waiver requests will give adequate protection to base receivers in the area. See Appendix B for a more detailed technical analysis of OOB interference.

The above discussion and analyses show that even the potential for interference to receivers from PTC transmitters is limited solely to the channels immediately adjacent to a PTC channel. Figure 2, which illustrates the spectrum holdings of NRTC and PTC-220, shows that there are only two places in the 220-222 MHz band where PTC-220 and NRTC have directly

adjacent channels.¹² If the proposed swap of PTC-220's J Block license with the AAR's Phase I license is consummated, there will only be a single such interface.

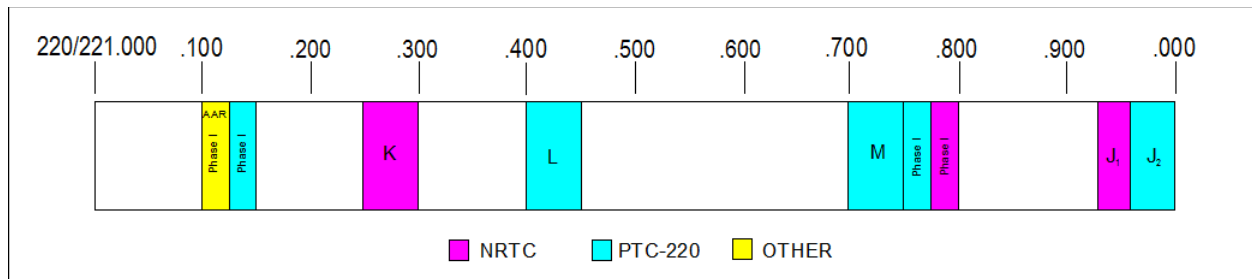


Figure 2: Nationwide licenses in the 220-222 MHz band. Both NRTC and PTC-220 hold all six regional licenses for their parts of the J Block, forming *de facto* nationwide licenses.

Both NRTC and PTC-220 hold significant amounts of spectrum in this band. This fact suggests that both entities have some measure of flexibility in choosing channels in a given area. PTC-220 stands ready to coordinate with NRTC in any situation where interference is expected or observed.

D. Protection Criteria Established in Section 90.723(d)-(e)

To provide for protection of receivers in the 221-222 MHz band, the Waiver Request proposes to extend the separation and ERP limits in Section 90.723(d)-(e) that currently apply to protect receivers in Sub-band A from spectrally adjacent base station transmitters in Sub-band B.¹³ NRTC questions whether these limits will be adequate for incumbent receivers because the criteria were developed for “specific frequencies” and based on technologies that were in use or contemplated in 1989.¹⁴ The logic behind these questions is not readily apparent. The spectral characteristics of the “specific frequencies” protected in Sub-band A are indistinguishable from

¹² NRTC also holds a license for the G Block in the southeast US, but this is for non-contiguous spectrum with no direct adjacency to any PTC-220 channels. In addition, PTC-220 holds six market-based E-Block licenses which also have no adjacency to any NRTC channels.

¹³ Waiver Request at 13-14.

¹⁴ NRTC Comments at 9. NRTC has licenses in Sub-bands A that are currently afforded protection by Section 90.723(d)-(e). If it had concerns about the effectiveness of the rule, presumably it would have raised them prior to this proceeding.

the frequencies in Sub-bands B and C, all of which are contained within the same one-megahertz span of spectrum. And while receiver technology indeed has changed since 1989, it has improved and become more adept at rejecting unwanted signals.¹⁵

III. GRANT OF THE WAIVER WOULD NOT UNDERCUT NRTC’S RIGHTS

NRTC complains that a grant of the Waiver Request would “unfairly undercut NRTC’s license rights and degrade its ability to expand its service in the future” by imposing “new restrictions on the location, power, or antenna height of stations that are inconsistent with the rules at the time NRTC acquired its licenses.”¹⁶ Nothing in the Waiver Request would lead to such a result. As already explained in section II above, in cases where another 220 MHz licensee wishes to locate a new station in relative proximity to a PTC-220 site, the Waiver Request proposes a coordination process whereby PTC-220 would be required to enter into good faith discussions with the licensee to assess and resolve any potential for harmful interference at the licensee’s desired location.¹⁷ If the licensee is not satisfied at the end of the 90-day discussion period, it may direct PTC-220 to modify its station or otherwise demonstrate PTC-220’s interference level at the potential victim site would be at or below the level that would be received if PTC-220 were operating without the advantage of the waiver. Accordingly, NRTC’s ability to expand its service would not be endangered.

NRTC is reminded that the deployment of PTC will only be along designated rail lines that meet certain criteria. On these routes, directional antennas will limit the “spillover” of PTC signals in directions perpendicular to the tracks. Thus, large suburban and rural areas will remain

¹⁵ Moreover, at the prior suggestion of NRTC (*see* note 3), the Waiver Request adds additional protection, not contained in Section 90.723(d), for existing Phase II and nationwide Phase I receivers within 25 kHz and between 6 and 10 km of a proposed PTC transmitter.

¹⁶ NRTC Comments at 1, 8.

¹⁷ Waiver Request at 16-17.

entirely clear of PTC operations. While it is understandable for NRTC to remind the Commission of its interest in expanding its operations in the future or in selling its spectrum to third parties who might deploy new services, the Commission should also be reminded that such future use is purely speculative. Until such additional use is actually ready to be realized in any given geographic area, there would be no harm in allowing a more productive use of spectrum in the band for PTC purposes.

IV. THE JUSTIFICATIONS FOR WAIVER ARE COMPELLING

NRTC misreads the justification for the Waiver Request as being “primarily financial.”¹⁸ While the tens of millions of extra dollars that will be required to deploy PTC without the waivers is a valid factor for consideration,¹⁹ it is not the only, and certainly not the most important, factor. Without a grant of the Waiver Request, PTC-220 will be forced to rely on a combination of two options, depending on the specific geographic location:

Option 1: allow half of its spectrum (221-222 MHz) to remain fallow and acquire additional spectrum (half of which will also remain fallow) on the secondary market to ensure adequate PTC capacity for its member railroads; and/or

Option 2: build many additional sites.²⁰

Each option has drawbacks from a public interest perspective.

¹⁸ NRTC Comments at 10-11. NRTC also offers a meaningless apples-to-oranges comparison, suggesting that a \$2 million savings in the Chicago area for the initial deployment is insignificant compared to the billions of dollars that will be required for PTC over a 20-year period. *Id.* It is irrelevant to compare costs for one metropolitan area over a 2-year initial build-out period, with costs for PTC across the entire country over a 20-year period. What is more relevant regarding the \$2 million additional cost estimate for Chicago is that it illustrates the scope of the challenge of designing a PTC system to accommodate the high level of railroad congestion in that market without a waiver.

¹⁹ See, e.g., Wilderness Valley Telephone Company Application and Request for Waiver to Operate a Microwave Path in the 6525-6875 MHz Band, *Order*, 15 FCC Rcd 11751, 11753 ¶ 6 (2000) (finding cost to constitute a “relevant factor in our determination of whether a waiver is appropriate”); see also Wayne County Sheriff Department Request for Waiver of Section 90.20(d)(54) of the Commission’s Rules, *Order*, 27 FCC Rcd 8167, 8170 ¶ 9 (2012).

²⁰ See Waiver Request at 21 (estimating that, absent a waiver, nearly 2.4 stations would be needed to provide the same track coverage as could be provided from a single station operating under the requested waiver).

At a time when the FCC and the Administration are struggling to find additional spectrum (particularly below 3 GHz) to satisfy exponentially increasing demands for commercial wireless services, Option 1 is an extremely inefficient use of a precious resource. More importantly, Option 1 will leave less spectrum available to non-member (short-line and commuter) railroads in two respects: (a) in congested markets, PTC-220 will only have enough capacity for its own members' use and will not be able to lease spectrum to non-members; and (b) PTC-220 will be competing against smaller railroads for the purchase of additional spectrum.

PTC-220 is in active negotiations with multiple non-member railroads seeking to lease spectrum. Currently, PTC-220 is engaged in spectrum discussions with 19 non-member rail entities, and has mutual non-disclosure agreements in place with 12 of these. To date, two long term spectrum leases have been executed in addition to three short term leases intended to support testing. Regarding the urgent spectrum needs of non-member railroads, the Commission should note in particular the comments of SCRRA – already a lessee of PTC-220 spectrum. SCRRA calculates that 14-19 channels of 220 MHz spectrum “will be required for *initial deployment* of PTC in the Los Angeles Basin,” while the total usable spectrum available today is only 12 channels.²¹ SCRRA explains that a waiver of Section 90.729(b) would increase the number of usable channels for PTC and significantly enhance its ability to implement critical PTC systems.²²

Option 2 (building more sites) may work in some areas, but it has a number of drawbacks in terms of network complexity, additional backhaul, and additional support requirements. Also, every new site contributes potential interference on a new frequency, further exacerbating challenges in the local RF environment. And again, smaller railroads will suffer. Where feasible, PTC-220 would construct enough additional sites to meet its members' needs, but may have

²¹ Comments of SCRRA, WT Docket No. 13-59 (filed April 8, 2013) at 4.

²² *Id.*

inadequate spectrum or resources to build even more sites to provide excess capacity for third-party leases.

Moreover, in dense environments, there may be no suitable existing sites or locations for new tower infrastructure. Even where locations are available, the construction of each new tower will require an initial environmental assessment that involves coordination with multiple federal, state and tribal stakeholders. The process requires detailed notices to designated Native American representatives by the railroads and the FCC, as well as comprehensive submissions to State and Tribal Historic Preservation Officers (“SHPOs” and “THPOs,” respectively), which must devote scarce resources to reviewing and responding to these submissions.²³ Moreover, for sites likely to have “a significant effect upon the quality of the human environment,” further environmental processing is required by the FCC.²⁴

NRTC also claims that “it is not clear” from the Waiver Request that “the statutory deadline is in jeopardy of being missed if the waiver were not granted.”²⁵ PTC-220 takes this opportunity to clarify that, without a grant of the Waiver Request, the RF design and construction of PTC systems will be more complex, thereby requiring more time to complete. Therefore, the absence of a waiver will increase the risk of missing the fast-approaching December 2015 statutory deadline.

²³ Nationwide Programmatic Agreement Regarding the Section 106 National Historic Preservation Act Review Process, *Report and Order*, WT Docket No. 03-128, FCC 04-22 ¶¶ 57, 64, 77 (Oct. 5, 2004); Clarification of Procedures for Participation of Federally-recognized Indian Tribes and Native Hawaiian Organizations Under the Nationwide Programmatic Agreement, *Declaratory Ruling*, 20 FCC Rcd 16092, ¶ 3 (Oct. 5, 2005); 47 C.F.R. Pt. 1, App. C, *Nationwide Programmatic Agreement Regarding the Section 106 National Historic Preservation Act Review Process*, § VII. A. 1; *see also* 47 C.F.R. Pt. 1, App. B, *Nationwide Programmatic Agreement for the Collocation of Wireless Antennas*.

²⁴ 47 C.F.R. §§ 1.1305-1.1307. The FCC must prepare an Environmental Impact Statement that identifies whether the tower is likely to have any effects and, if so, whether those effects can be mitigated or eliminated. *Id.* §§ 1.1305, 1.1308-1.1319. This process is thorough, requiring the compilation of extensive information, dedication of significant FCC resources, and opportunities for public comment.

²⁵ NRTC Comments at 10.

Finally, NRTC asserts that PTC-220 selected the 220 MHz band “with full knowledge that NRTC and others already held licenses and had developed their own systems in this band.”²⁶ PTC-220’s members were required *by law* to find spectrum for PTC and there were no unencumbered “greenfield” bands with suitable propagation characteristics. One advantage, in fact, of the 220 MHz band, is that it has historically been an underutilized band, with many licensees having had licenses terminated for failure to construct.²⁷ Indeed, at the time PTC-220 acquired its licenses, PTC-220 had no way to know whether NRTC would satisfy the construction requirements for all of its current licenses, as that was only determined affirmatively by the Commission four months ago.²⁸

V. IT IS APPROPRIATE TO GRANT THE INSTANT REQUEST BY WAIVER RATHER THAN RULEMAKING

NRTC asserts that the Waiver Request should be addressed through a rulemaking proceeding rather than the Commission’s waiver process. NRTC posits that granting the Waiver Request would be an “abuse of discretion” because it would effectively place a new condition on the licenses of other licensees, by obligating them to coordinate new stations with PTC-220.²⁹ Yet Part 90 licensees already have an obligation pursuant to Section 90.173(b) to cooperate on issues related to interference. The Waiver Request simply suggests a process by which such cooperation/coordination could occur where sites relying on the proposed waiver are at issue.³⁰

²⁶ NRTC Comments at 10.

²⁷ *See, e.g., Warren C. Havens et al., Applications for Renewal of 220 MHz Licenses, Order*, 27 FCC Rcd 5841 (Mob. Div, WTB 2012) (finding that 220 MHz licenses had terminated for failure to construct); *see also id.* at ¶ 21 (citing to similar treatment of other 220 MHz licensees).

²⁸ *See* NRTC Comments at 3, n.3.

²⁹ NRTC Comments at 12.

³⁰ Waiver Request at 16-17. Even without grant of the Waiver Request, NRTC would not be free of an obligation to cooperate/coordinate with PTC-220 if it desired to place a new station in relatively close proximity to an existing PTC-220 station. Moreover, as explained in section II, *supra*, and in Appendix A,

Detailing this process and eliminating the vagaries of Section 90.173(b) benefits other licensees by placing the burden on PTC-220 to make any needed changes to enable a proposed new station to be placed at a given location as if the waiver were not in effect. Unfortunately, NRTC's comments seem to reject any coordination process, rather than making specific suggestions or proposals about how to facilitate coordination. While NRTC does offer to "participate constructively" in a notice and comment rulemaking proceeding,³¹ this notice and comment waiver proceeding presents an appropriate and comparable opportunity to engage in such dialogue.

NRTC fails to cite any instance in which the Commission has rejected a waiver request on the grounds it has raised. To the contrary, in prior proceedings the Commission has granted waiver requests even when commenters claimed, similar to NRTC, that granting a waiver would modify the license of existing licensees or cause interference to other licensees.³² In both its *Aircell Order* and *Nextel Order*, the Commission found that granting a waiver of its rules would not negatively affect other licensees because the waiver recipients would still be required to not cause harmful interference to other licensees, as would be the case here.³³ While it is not an uncommon rhetorical tactic for parties opposed to a waiver request to suggest that the matter should be addressed through a rulemaking, in such cases the Commission has nonetheless often

NRTC exaggerates the scope of the coordination zones that would result from a grant of the Waiver Request.

³¹ NRTC Comments at 13 ("NRTC would be pleased to participate constructively ... in any such [rulemaking] proceeding ...").

³² See e.g., *Aircell, Inc., Petition, Pursuant to Section 7 of the Act, For a Waiver of the Airborne Cellular Rule, or, in the Alternative, for a Declaratory Ruling, Order*, 14 FCC Rcd 806 ¶ 21(1998) ("*Aircell Order*") (noting that licensees argued granting the requested waiver would modify their licenses); *Nextel Communications, Inc., Request for Waiver to Operate 800 MHz Canadian Primary Frequencies in U.S./Canada Border Area Region 3 on a Secondary Basis, Order*, 16 FCC Rcd 7892 ¶ 5, 11 (2001) ("*Nextel Order*") (explaining that a majority of commenters argued that the Commission should address the matter in a formal rulemaking because the waiver could affect local SMR businesses and potentially interfere with other licensees).

³³ *Aircell Order* ¶ 21; *Nextel Order* ¶ 11.

found that a formal rulemaking is unnecessary to address the matter and proceeded to find that granting the waiver was in the public interest.³⁴

With no helpful Commission precedent, NRTC cites several court cases to support the proposition that granting the Waiver Request would constitute a *de facto* rulemaking and an abuse of the Commission's discretion.³⁵ However, the cited cases are inapposite, as they do not involve grants of waivers but other forms of adjudications.³⁶ The FCC has often categorized waivers as distinct from other forms of adjudications³⁷ which, unlike waivers, usually "resolve disputes among specific individuals," as NRTC notes.³⁸

Relying solely on a rulemaking proceeding in the current situation, even if it ultimately resulted in authorizing the alternative operational criteria PTC-220 seeks, would be of little benefit to PTC-220. PTC-220's members do not have the year or more that a rulemaking proceeding

³⁴ See, e.g., In the Matter of Northern Telecom Inc., Petition for Waiver of the Signal Power Limitations Contained in Section 63.308(e)(1) of the Commission's Rules, *Memorandum Opinion and Order*, 14 FCC Rcd 12048 ¶ 12 (1999) ("*Northern Telecom*") (citing comments by BellSouth that a waiver request should "be held in abeyance pending a rulemaking proceeding ... rather than 'inviting *de facto* rulemaking through an ad hoc waiver process'").

³⁵ NRTC Comments at 12 (citing *Am. Airlines, Inc. v. Dep't of Transp.*, 202 F.3d 788, 798 (5th Cir. 2000); *NLRB v. Bell Aerospace Co.*, 416 U.S. 267, 294 (1974)).

³⁶ In *Am. Airlines, Inc. v. Dep't of Transp.*, the court held that the Department of Transportation had not overstepped its authority in issuing a Declaratory Order, rather than conducting a formal rulemaking, in addressing an issue involving air service at competing airports. In *NLRB v. Bell Aerospace Co.*, the Supreme Court noted that an agency's overreliance on adjudication can be an abuse of the agency's discretion, but the Court did not cite or discuss any instances in which an agency's use of adjudication instead of a formal rulemaking process had actually become an abuse of agency discretion.

³⁷ See WT Docket No. 02-55, Letter from David L. Furth, Associate Bureau Chief, FCC, to James B. Goldstein, Director – Spectrum Reconfiguration, Sprint Nextel Corp., 22 FCC Rcd 2736, 2737 (2007) (noting that FCC determinations can be made "by rule, adjudication, or waiver"); 1998 Biennial Regulatory Review – 47 C.F.R. Part 90 – Private Land Mobile Radio Services, Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services; *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 16673, 16691 (2000) (explaining that the FCC "has discretion to proceed by means of rulemaking waiver, declaratory ruling, or even adjudication in making policy, so long as all interested parties are afforded notice and an opportunity to present their position").

³⁸ NRTC Comments at 12 and n.14. In note 14, NRTC cites several cases to define the difference between an adjudication and a rulemaking; however, none of these cases presents fact patterns similar to those here, nor do any address an agency waiver process.

would take before completing RF designs and beginning construction of sites. The statutory deadline faced by PTC-220 is a unique circumstance justifying a waiver. If the waiver is denied or substantially delayed, PTC-220's members must reluctantly proceed using Options 1 and 2 discussed above to deploy PTC networks.

NRTC's remaining argument for a rulemaking is that other licensees may also desire the same flexibility PTC-220 is requesting, and that the processing of multiple waiver requests would present an administrative burden for the Commission.³⁹ Generally, once the Commission has granted a particular type of waiver to one party, granting additional identical waivers represents a much smaller administrative burden for Commission staff. Nevertheless, should the Commission determine that a future rulemaking would be in the best interest of the users of the band, it would not preclude the granting of the Waiver Request in the interim. In similar cases where the prospect of a lengthy rulemaking threatened to delay the deployment of new services, the Commission has recognized "that the public interest favors not delaying innovative technology that meets our requirements for waiver pending the more lengthy rulemaking process."⁴⁰ Indeed, specifically in the railroad context, the Commission granted waivers in 2010 to allow higher power limits for end-of-train devices pending the outcome of a rulemaking proceeding which has just concluded, some two-and-a-half years later.⁴¹ Therefore, the Commission should grant the Waiver Request, even if it determines to launch a related rulemaking proceeding.

³⁹ NRTC Comments at 13.

⁴⁰ *Northern Telecom* at ¶ 12.

⁴¹ See Amendment of Part 90 of the Commission's Rules, WP Docket No. 07-100, FCC 13-52, *Fifth Report and Order*, (rel. April 18, 2013) at ¶ 3 (citing waivers granted in 2010 "pending the outcome of the rulemaking proceeding").

VI. CONCLUSION

For the foregoing reasons, PTC-220 respectfully requests that the Commission reject the arguments contained in the NRTC Comments and grant the requested waivers.

Respectfully submitted,

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APPENDIX A

How much “exclusion zone” area would there be in a congested area?

Placing a sensitive receiver near a transmitter, even when the operating frequencies of the two devices are far apart, can lead to “desensitization” of the receiver due to high energy levels in the receiver’s low level circuits. This can create a zone around a transmitter within which the performance of receivers may be impaired to some degree. Network designers may designate a specific level of impairment that would define an “exclusion zone” around the transmitter. NRTC is concerned about dense areas with many transmitters and thus many exclusion zones.

PTC’s densest area by far is Chicago. The preliminary network design for Chicago comprises 36 base stations to cover an included area of approximately 2000 square miles (5180 Km²).

Each base station has a 75 (PEP) watt transmitter, and an antenna system with a net 5 dB gain, which yields an ERP of 237 Watts, or 53.8 dBm. Using NRTC’s maximum interfering signal level of -25 dBm at a potential victim receiver site,¹ this implies a required path loss of at least 78.8 dB to protect the receiver. Applying NRTC’s formula for path loss,² the following table shows the required geographical spacing:

Distance Exponent	Required Spacing, Km	Exclusion Zone Area per Base, Km ²
2.0 (Free Space)	0.94	2.78
2.4	0.30	0.28

Table A1: Radius and area of “exclusion zones” around PTC transmitters.

The table also shows the area of the effective exclusion zone for each base station implied by the spacing radius. The total exclusion area for the 36 base stations in Chicago is then about 100 Km² for the free space loss assumption, or about 10 Km² for a distance exponent of 2.4. Using these numbers, the total “exclusion area” for PTC transmitters represents less than 2% of the Chicago area under a free space assumption, or less than 0.2% using the 2.4 distance exponent. In a highly built-up area like Chicago, path loss characteristics are not likely to approach free space, so the lower percentage figure (using the 2.4 distance exponent) is the more realistic result.

It should also be added that PTC transmitters will be a small minority of the transmitters in an area like Chicago, and will represent a very minor contribution to the already high levels of RF energy in the environment.

¹ NRTC comments, Appendix II, Section VI.

² NRTC comments, Appendix II, Section IV.

APPENDIX B

How much real OOB protection is offered by the provisions in the waiver request?

The figure below shows a laboratory measurement of out-of-band energy from a PTC base transmitter in the first two adjacent 12.5 KHz channels on either side. The received bandwidth of the potential victim receivers is set to 8 KHz – a typical value for receivers on a 12.5 KHz channel.

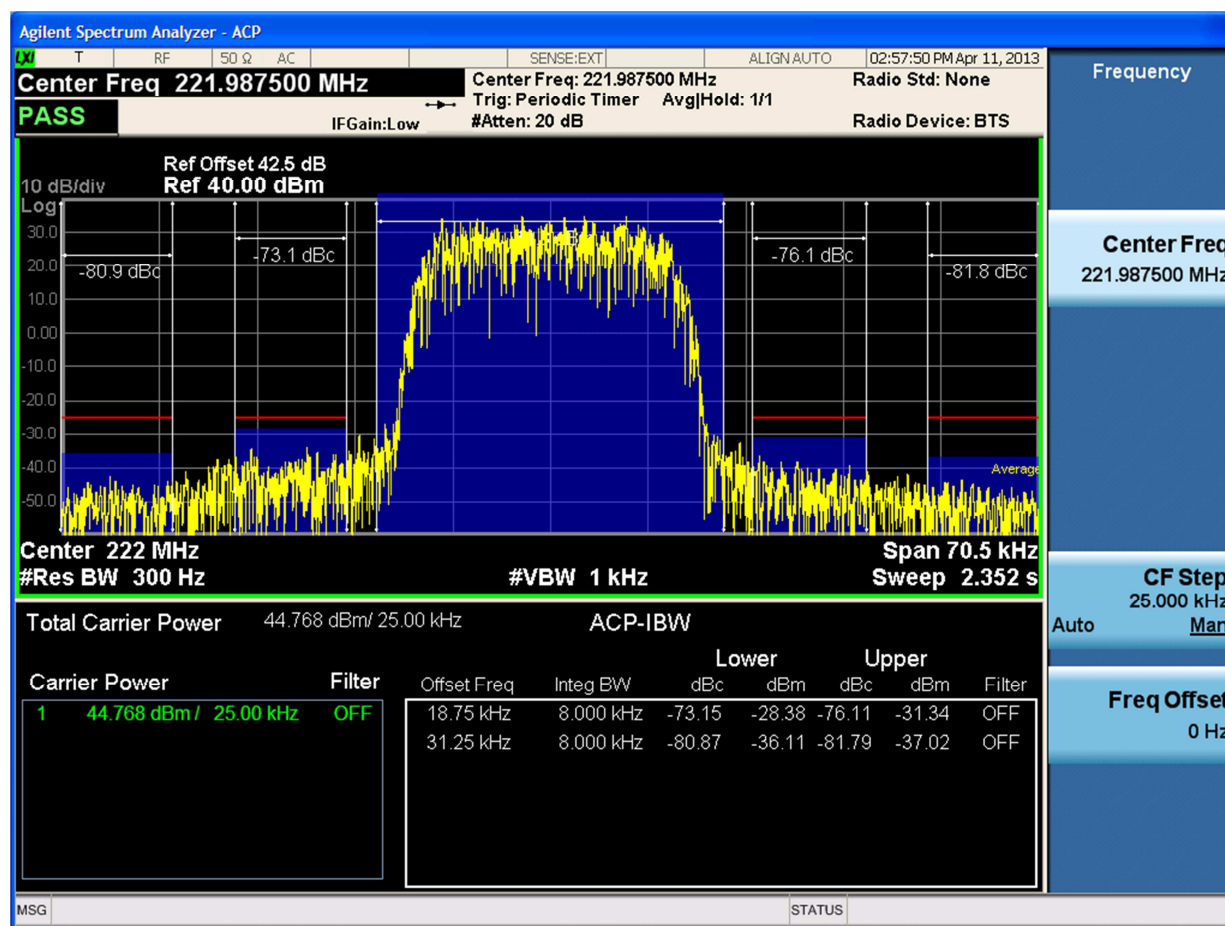


Figure B1: Laboratory analysis of OOB power in adjacent channels

The figure indicates that OOB power levels are -28.38 dBm and -31.34 dBm in the lower and upper first adjacent channel, respectively, and -36.11 dBm and -37.02 dBm for the lower and upper second adjacent channels. Since these are average power figures, they are adjusted by adding the 3 dB Peak-to-Average ratio for this modulation. The levels are then increased by 5 dB more to reflect the net transmit antenna gain, yielding the actual transmitted OOB levels:

	Lower Adjacent Channels	Upper Adjacent Channels
First Adjacent	-20.38 dBm	-23.34 dBm
Second Adjacent	-28.11 dBm	-29.02 dBm

Table B1: Transmitted OOB PEP on adjacent 12.5 KHz channels.

In its waiver request, PTC-220 proposes to protect potential victim receivers up to six Km away from a PTC transmitter site by imposing the ERP/spacing regimen described in Section 90.723(d). To address remaining NRTC concerns about noise floor degradation, PTC-220 offers further protection of receiver sites up to 10 Km away. The following analysis calculates the effect of OOB levels shown above at a 10 Km distance.

Using the path loss formula suggested by NRTC,¹ the following graphs show the degradation of the noise floor at a receiver site 10 Km away in the first two 12.5 kHz channels adjacent to a PTC channel. These graphs use the worst (highest) of the values in Table B1 (*i.e.*, -20.38 dBm and -28.11 dBm for the first and second adjacent channels, respectively).

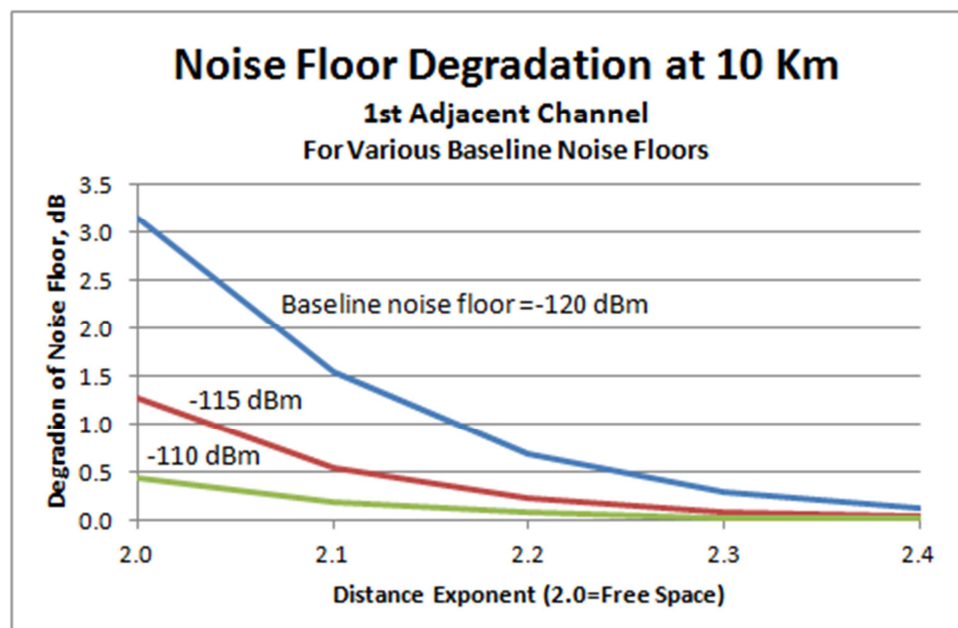


Figure B2: Receive noise floor degradation due to PTC OOB in first adjacent channel. Degradation is measured from a baseline noise floor.

¹ NRTC Comments, Appendix II, Section IV.

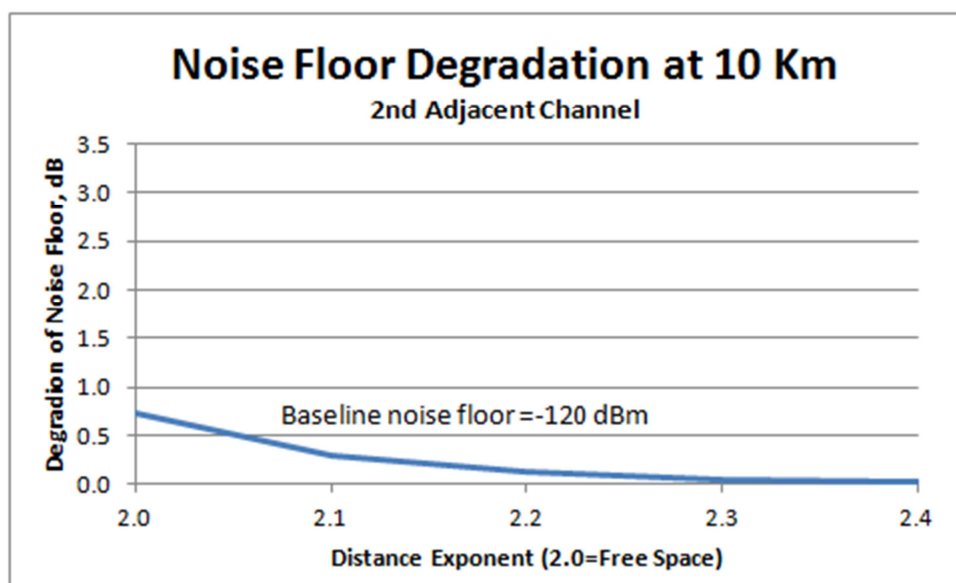


Figure B1: Receive noise floor degradation due to PTC OOB for second adjacent channel. Curves for noisier baseline conditions are very close to zero.

As the graphs plainly show, the noise floor degradation on the second adjacent channel is negligible at a distance of 10 Km. The trend indicated by the two graphs also implies that all receive channels beyond the second adjacent would be affected even less.

The graph for the first adjacent channel shows some potential for a degraded noise floor, but only with a combination of pessimistic assumptions: Near free space propagation loss, and a quiet site to begin with.

The -120 dBm baseline noise floor in the graphs is the same as offered by NRTC as the assumed site noise floor,² and this is a reasonable figure. However, many sites have higher noise floors, especially if there are other transmitters or other electronic equipment at the site, or if the site is near sources of RF energy. Higher baseline noise levels are less influenced by a given level of added interference, as Figure B2 shows.

Quiet receive sites (those with low noise floors) will typically be in rural areas, and these are just the areas where PTC-220 will have the most flexibility in choosing channels with minimum impact to receivers in the area. This is the reasoning behind PTC-220's proposed methodology for limiting interference to receivers by setting a limit to noise floor degradation.

The graph in Figure B1 also indicates that at a quiet site, only for effective distance exponents well below 2.1 would the expected noise floor degradation exceed the 2 dB threshold. We hold that this will be a rare situation, and will remedy it if it occurs.

² NRTC Comments, Appendix II, Section IV.